

## ORIGINAL ARTICLE

# Prevalence and Predictors of Depression among Oncology Patients Receiving Chemotherapy in Government Hospitals in Peninsular Malaysia

Mamta Vesudave Remesh Kumar<sup>1</sup>, Sherina Mohd Sidik<sup>1</sup>, Lekhraj Rampal<sup>2</sup>, Siti Irma Fadhilah Ismail<sup>1</sup>, Ummavathy Periasamy<sup>3</sup>

<sup>1</sup> Department of Psychiatry, Faculty of Medicine and Health Science, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia

<sup>2</sup> Department of Community Health, Faculty of Medicine and Health Science, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia

<sup>3</sup> Hospital Tuanku Jaafar, Jalan Rasah, Bukit Rasah, 70300 Seremban, Negeri Sembilan, Malaysia

## ABSTRACT

**Introduction:** Cancer-patients undergoing chemotherapy experience a high level of depression. The objective of this study was to determine the prevalence and predictors of depression in cancer-patients receiving chemotherapy in government hospitals in Peninsular Malaysia. **Methods:** This research was started with a cross-sectional study among 1356 patients undergoing chemotherapy in 10 government state hospitals in the Peninsular Malaysia. The data were collected using self-administered questionnaires including socio-demographic characteristics, severity of cancer, depression through Patient Health Questionnaire (PHQ-9), social support using the Multidimensional Scale of Perceived Social Support (MSPSS) and hopelessness using the Beck Hopelessness Scale (BHS). The research also conducted the descriptive statistics to obtain variable percentages and frequencies. Inferential analysis was also conducted by using chi-square or Fisher's exact test in determining the relations among variables at the level of significance where  $p < 0.05$ . Simple logistic regression was applied in determining the crude odd-ratio and variables with  $p$  value, where  $p < 0.25$ , were entered into the multivariate logistic regression model to identify the significant predictors of depression. The best predictor was based on adjusted odds ratio. **Results:** The prevalence of depression was 34.00%. The significant predictors of depression were age, gender, education level, pain due to chemotherapy, depressed due to cancer, treatment with any anti-depressant, worried of the adverse effect due to cancer treatment, involvement in any cancer support society, level of social support and level of hopelessness. Among all predictors, level of social support was identified as the highest risk of prediction for depression. **Conclusion:** Findings of the study indicate that the health care services should focus on the management and intervention of depression in cancer-patients.

**Keywords:** Depression, Cancer, Chemotherapy, Predictors, Malaysia

## Corresponding Author:

Sherina Mohd Sidik, PhD

Email: sherina@upm.edu.my

Tel: +603-8947 2530

## INTRODUCTION

Cancer is a global public health concern. Cancer occurs when our cells begin to reproduce in an uncontrollable manner. Once cancer has manifested, it eventually spreads to other parts of the body. The consequences of cancer are various with the most severe being death (1). Till now, about 14.1 million new cases of cancer were reported with 8.2 million cancer deaths and 32.6 million are living with cancer diagnosis for the period of 5 years (2). In terms of the burden of disease, the number of cancer cases, deaths, and disability-adjusted

life-years (DALYs) are 14.9, 8.2, and 196.3 million, respectively (3). In Malaysia, cancer has been as one among the top five causes of death (4). In year 2014, cancer death was higher in males with 11,200 deaths compared to females with 10,300 deaths (5). Cancer patients, who are undergoing chemotherapy, normally experience a greater level of depression (6). Cancer patients have depression due to many reasons such as reaction to cancer diagnosis, symptoms associated with cancer and worrying about the progression of cancer. Besides that, radiotherapy and chemotherapy treatment for cancer patients also contributes to the depression (7). In some cases, depression experienced by patients after the diagnosis of cancer is more adaptable because patients have better understanding about the symptoms and treatment of cancer. Depression is a state of mental disorder and the usual signs of depression are tiredness,

loss of appetite, depressed mood and followed by sadness (1). Clinical depression is a serious illness as it can cause patients to feel distressed and it is harder for a patient to function as well as to follow treatment plans. Individuals who suffer from depression even prior to diagnosis of cancer are more likely to have suicidal thoughts (8). Depression is common both in cancer patients and among the immediate family members (9). Several studies have been conducted on depression among cancer patients in Malaysia focusing specifically on certain types of cancer and study locations (example of locations are University Malaya Medical Centre, Kuala Lumpur, University Kebangsaan Malaysia Medical Center, Kuala Lumpur and Hospital Sultanah Bahiyah, Alor Star) (6, 10, 11, 12). However, to our understanding there is still lack of information regarding the prevalence and predictors of depression among oncology patients undergoing chemotherapy. We therefore intend to investigate the prevalence and predictors of depression among oncology patients who are receiving chemotherapy in government state hospitals in Peninsular Malaysia. This study provides information on prevalence and predictors of depression among chemotherapy patients in Peninsular Malaysia. Other than that, this study enhances our understanding of the relationship between chemotherapy and how it affects depression. The outcome of this study benefits the pharmacists to counsel oncology patients accordingly and provide proper information regarding disease, treatment, and factors related with depression among cancer patients. Researchers and staffs in clinical settings can use the outcome of this research in preparation of intervention programs for cancer patients with depression.

## MATERIALS AND METHODS

### Study design and location

A cross-sectional research study was conducted from April to August 2016. This research focused on 1356 cancer patients who were undergoing chemotherapy treatment in oncology wards and daycare units of 10 government state hospitals throughout the Peninsular Malaysia. The inclusion criteria was Malaysian citizens who were receiving chemotherapy as cancer patients and the exclusion criteria were patients who were too ill to participate in this study, patients with hearing and speech difficulties and patients who had any psychotic features.

### Sample size

Sample size was calculated by using the formula from a two-group comparison as presented by Lemeshow et al., (1990). The sample size calculated was 1356.

### Sampling technique

Ten government hospitals were selected based on the highest number of chemotherapy patients using cluster sampling. For the selection of patients from

each hospital, sampling with probability proportional to size was applied. The list of patients undergoing chemotherapy was obtained from the pharmacy-in-charge of the cytotoxic drug reconstitution (CDR) unit. All the patients in the list were included in this study.

### Instruments

For the data collection, a self-administered validated and pretested questionnaire was used. The questionnaires were in Malay and English languages. There were four sections in the questionnaire:

#### Section A (Socio demographic characteristics and severity of cancer)

This section includes the questions regarding socio demographic characteristics and severity of cancer. Socio demographic characteristics consist of respondents' age, gender, ethnicity, religion, marital status, family member living together, education level, family history of cancer, pain due to chemotherapy, if patient is depressed due to cancer, treating with any anti-depressant, if patient is worried of the chemotherapy adverse effects and if patient has joined any cancer support society. Severity of cancer consists of stage of cancer and number of chemotherapy cycle.

#### Section B (Patient Health Questionnaire [PHQ-9])

This section consisted of questions on depression which was detected using the Patient Health Questionnaire 9 (PHQ-9). This questionnaire consisted of nine items and the score ranged from 0-27. There were four choices in the PHQ-9 which were scored as follows:

- 0-for "Not at all"
- 1-for "Several days"
- 2-for "More than half the days"
- 3-for "Nearly every day"

A threshold score of 0-4 was considered to indicate none to minimal depression, 5-9 indicated mild depression, 10-14 indicated moderate depression, 15-19 indicated moderately severe depression, and 20-27 indicated severe depression (13). The PHQ-9 was found as, reliable and valid tool (14). Assessment on the severity of depression using the PHQ-9-in-cancer-patients-and-the-general population has shown that the scale was reliable among cancer patients (Cronbach's  $\alpha \geq 0.84$ ) (15). The PHQ-9 scale showed effective results in screening lung cancer patients in busy outpatient settings (16). PHQ-9 was found to be valid, reliable, and a responsive depression measure in adults with cancer and also freely available to use (17). The Malay version of PHQ-9 has been validated in primary care clinics in Malaysia among 895 participants with sensitivity 87.00% and specificity 82.00%. The cutoff point of 10 and above was used in PHQ-9 (18). In this study, a cut-off point of 10 and above was used.

#### Section C (Beck Hopelessness Scale [BHS])

The Beck Hopelessness Scale (BHS) was used in this

study to measure hopelessness in three major aspects, such as feelings about the future, loss of motivation, and expectations (19). The questionnaire consisted of twenty items. Hopelessness among the respondents was determined using the cut-off point of nine. The respondents answered "True" for the statement that best described their attitude for the past week including the day they answered the questionnaire and if the statement did not describe their attitude, the respondents answered "False". This scale's internal consistency ranged from 0.8-0.9 and its test-retest scores was 0.7 (19). For the Malay version of Beck Hopelessness Scale, minimal translation was done without validity of the questionnaire.

#### **Section D (Multidimensional Scale of Perceived Social Support [MSPSS])**

This section contained questions on social support perceived by patients. Social support was detected using the Multidimensional Scale of Perceived Social Support (MSPSS).

This questionnaire consisted of twelve items and the scores ranged from 12-84. There were seven choices in the MSPSS which were scored as follows: 1 for "Very strongly disagree", 2 for "Strongly disagree", 3 for "Mildly disagree", 4 for "Neutral", 5 for "Mildly agree", 6 for "Strongly agree" and 7 for "Very strongly agree". The score of 69 to 84 indicated high social support, 49 to 68 indicated moderate social support and 12 to 48 indicated low social support (20). The validation for MSPSS Malay version was done in University Malaya's Medical Faculty among 237 students (21). A good internal consistency was shown by this instrument (Cronbach's alpha is 0.89), parallel form reliability as 0.94, and test-retest reliability as 0.77 (Spearman's rho,  $p < 0.01$ ). Meanwhile the reliability coefficients for family, friends and significant others are 0.88, 0.82 and 0.94 (21).

#### **Reliability of Questionnaire (Cronbach alpha)**

The data collected during the pretesting were analysed to check for internal consistency of the questionnaire where a Cronbach alpha coefficient value was used to determine the reliability of the questionnaire. All questionnaires showed high reliability with Cronbach alpha value of 0.7 and above.

#### **Ethics Approval**

Approvals were obtained from the Medical Research and Ethics Committee (MREC) and Ethics Committee for Research Involving Human Subjects Universiti Putra Malaysia prior to data collection. The approval from MREC was obtained using the registration of the national study. This study was a baseline study for the national study. Permission was also obtained from Hospital Directors, Heads of Pharmacist Departments and pharmacists in-charge CDR units. As for the respondents, explanation of the study objectives and data collection

process was provided in the information sheets given to them. The researcher who was present throughout the data collection provided further explanation verbally. Written consent was also obtained from the respondents before the collection of data. All the respondents were well informed that they have a choice to retract their participation from this research at any time. Permission for the questionnaires used in this research was obtained from the respective authors.

#### **Data Analysis**

Data were collected using self-administered questionnaires including socio-demographic characteristics, severity of cancer, depression, social support and hopelessness. Data were analyzed by using SPSS (Statistical Package for Social Sciences) software Version 22.0. Descriptive statistical analysis was conducted to obtain the percentage and frequency of variables. Inferential analysis was conducted by using chi-square or Fisher's exact test to identify the relation among variables at the significance level where  $p < 0.05$ . Simple logistic regression was used to determine the crude odd ratio and variables with  $p$  value  $< 0.25$  were entered into the multivariate logistic regression model to determine significant predictors of depression. The results were interpreted based on the obtained adjusted odds ratio and  $p$ -value. The best predictor was based on adjusted odds ratio. When the odds ratio was greater than 1, it described a positive relationship. A  $p$ -value less than 0.05 ( $p < 0.05$ ) was considered statistically-significant. The Nagelkerke R Square, Hosmer-and-Lemeshow Test, classification table and area under the Receiver-Operating-Characteristic (ROC) curve were shown in this study. The value-of Nagelkerke R-Square was reported to show the amount of variation in depression that was explained by the model. Meanwhile -for Hosmer -and Lemeshow-Test,  $p$ -value more than 0.05 showed that the model was "fit". The classification table indicated the ability of the model to predict the correct-category for depression (Yes or No) for each case. The area under the ROC curve was used to measure the model discrimination.

#### **RESULTS**

Out of 1356 respondents, all respondents participated in this study, giving an overall response rate of 100.00%. Majority of the respondents were female (57.00%). Approximately half of the respondents were Malays (43.20%), followed by Chinese (37.00%), Indians (16.40%), and others (3.30%). 'Others' consisted of Sikh, Kadazan and Iban. Majority (44.00%) of the respondents were Muslims, followed by Buddhists (35.60%), Hindus (10.70%), Christians (7.20%), others (2.20%) and no religion (0.30%). Majority of the respondents were married (37.20%) followed by widowed (32.70%), single (15.60%), divorced (8.50%) and separated (6.00%). The results showed that 29.50% received primary education and 25.70% received no education. Only 38.90%

received secondary education, while 5.90% received a university education. The higher respondents were at the 4th stage of cancer which was 28.50%. A majority (39.50%) of respondents were undergoing 3rd cycle of chemotherapy. Majority of the respondents were not treated with any anti-depressant (82.70%). The results also show that 61.10% of the respondents were worried about the adverse effect due to cancer treatment. Out of 1356 respondents, only 672 respondents joined any cancer support society. Majority of the respondents had medium support (37.80%). A total of 62.30% of respondents had feelings of hopelessness (mild=24.50%, moderate=26.40% and severe=11.40%). The prevalence of depression among oncology patients receiving chemotherapy were 34.00%.

Based on Table I, Table 11 and Table III, age, gender, marital status, family members living together, education level, stage of cancer, number of chemotherapy cycle, family history of cancer, pain due to chemotherapy, depressed due to cancer, treatment with any anti-depressant, worried of the adverse effect due to cancer treatment, involvement in any cancer support society, level of social support and hopelessness were found to be statistically significantly associated with depression ( $p < 0.05$ ).

In the simple logistic regression for depression, all of the 15 factors were selected based on  $p < 0.25$  for multivariate analysis. All these factors were entered into the multivariate logistic regression models to identify the significant predictors. Out of these 15 factors, only ten factors were selected using the stepwise selection method to identify the predictors for depression.

According to Table IV, the best predictor for depression was level of social support. Respondents with low level of social support compared to respondents with medium or high levels of social support were 6.680 times more likely to have depression (AOR 6.680, 95% CI 4.815 to 9.269).

The value of Nagelkerke R square was 0.490. Hosmer and Lemeshow test indicated that this model was fit ( $p = 0.082$ ). Based on the classification table, 79.60% of cases were classified correctly. Figure 1 showed the area under the ROC curve was found to be 0.871 (95% CI 0.852 to 0.889,  $p < 0.001$ ), which means that the model is able to discriminate 87.10% of the cases in this study.

## DISCUSSION

### Response rate

The response rate of this study was 100.00%; which was similar to the response rate in a study done among 283 elderly African American cancer patients on the predictors of depression (22).

**Table I:** Association between socio-demographic characteristics and depression (N=1356)

Variables	Depression (PHQ-9)					
	Yes	No	Total	x	df	p-value
<b>Age</b>						
≤60	229 (28.00%)	589 (72.00%)	818	33.099	1	<0.001**
>60	232 (43.10%)	306 (56.90%)	538			
Total	461 (34.00%)	895 (66.00%)	1356			
<b>Gender</b>						
Male	161 (27.60%)	422 (72.40%)	583	18.559	1	<0.001**
Female	300 (38.80%)	473 (61.20%)	773			
Total	461 (34.00%)	895 (66.00%)	1356			
<b>Ethnicity</b>						
Malay	200 (33.30%)	401 (66.70%)	601	0.249	1	0.618
Non-Malay	261 (34.60%)	494 (65.40%)	755			
Total	461 (34.00%)	895 (66.00%)	1356			
<b>Religion</b>						
Muslim	203 (33.20%)	409 (66.80%)	612	0.340	1	0.560
Non-Muslim	258 (34.70%)	486 (65.30%)	744			
Total	461 (34.00%)	895 (66.00%)	1356			
<b>Marital status</b>						
Single	387 (35.50%)	702 (64.50%)	1089	5.846	1	0.016*
Married	74 (27.70%)	193 (72.30%)	267			
Total	461 (34.00%)	895 (66.00%)	1356			
<b>Family member living together</b>						
Living alone	28 (47.50%)	31 (52.50%)	59	4.981	1	0.026*
Living with someone	433 (33.40%)	864 (66.60%)	1297			
Total	461 (34.00%)	895 (66.00%)	1356			
<b>Education</b>						
Educated	309 (30.70%)	699 (69.30%)	1008	19.553	1	<0.001**
Non-educated	152 (43.70%)	196 (56.30%)	348			
Total	461 (34.00%)	895 (66.00%)	1356			

\* Significant at  $p < 0.05$       \*\* Significant at  $p < 0.001$

### Prevalence of Depression

The study found that the prevalence of depression in oncology patients receiving chemotherapy was 34.00%. Based on a research carried out on the prevalence of depression among patients with newly diagnosed advanced gastrointestinal cancer using the Patient Health Questionnaire-9 (PHQ-9), 25.80% of the respondents showed high levels of depression (23). A cross-sectional study was conducted in Thailand to determine the prevalence of depression among cancer patients by using the Patient Health Questionnaire-9 (PHQ-9) with a cut off score of 10. Among the 108 patients, 32 patients (29.60%) were classified in the depressive

**Table II:** Association between socio-demographic characteristics and severity of cancer with depression (N=1356)

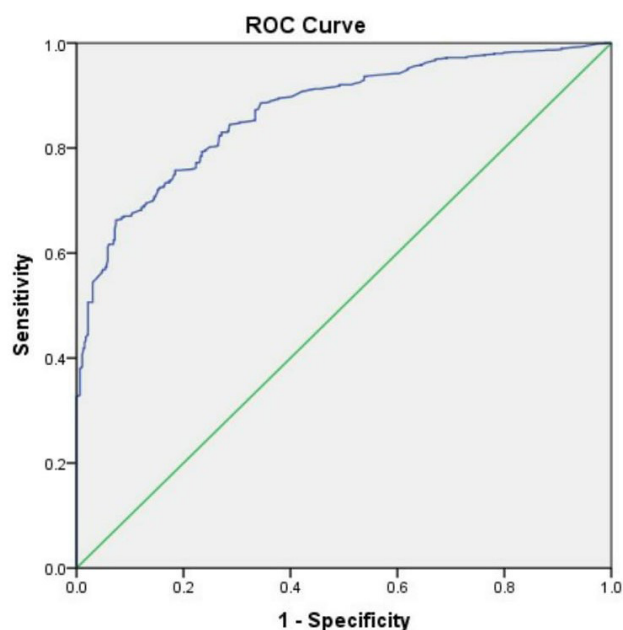
Variables	Depression (PHQ-9)			x	df	p-value
	Yes	No	Total			
<b>Stage of cancer</b>						
1 and 2	247(36.90%)	422(63.10%)	669	5.030	1	0.025*
3 and 4	214(31.10%)	473(68.90%)	687			
Total	461(34.00%)	895(66.00%)	1356			
<b>Number of chemotherapy cycle</b>						
1 and 2	198(37.50%)	330(62.50%)	528	4.729	1	0.030*
3 and more	263(31.80%)	565(68.20%)	828			
Total	461(34.00%)	895(66.00%)	1356			
<b>Family history of cancer</b>						
Yes	298(32.20%)	627(67.80%)	925	4.113	1	0.043*
No	163(37.80%)	268(62.20%)	431			
Total	461(34.00%)	895(66.00%)	1356			
<b>Pain due to chemotherapy</b>						
Yes	345(44.10%)	437(55.90%)	782	84.326	1	<0.001**
No	116(20.20%)	458(79.80%)	574			
Total	461(34.00%)	895(66.00%)	1356			
<b>Depressed due to cancer</b>						
Yes	347(44.20%)	438(55.80%)	785	86.550	1	<0.001**
No	114(20.00%)	457(80.00%)	571			
Total	461(34.00%)	895(66.00%)	1356			
<b>Treating with any anti-depressant</b>						
Yes	102(43.60%)	132(56.40%)	234	11.597	1	<0.001**
No	359(32.00%)	763(68.00%)	1122			
Total	461(34.00%)	895(66.00%)	1356			
<b>Worried of the adverse effect due to cancer treatment</b>						
Yes	390(47.10%)	438(52.90%)	828	162.737	1	<0.001**
No	71(13.40%)	457(86.60%)	528			
Total	461(34.00%)	895(66.00%)	1356			
<b>Involvement in cancer support society</b>						
Yes	159(23.70%)	513(76.30%)	672	63.431	1	<0.001**
No	302(44.20%)	382(55.80%)	684			
Total	461(34.00%)	895(66.00%)	1356			

\* Significant at p <0.05      \*\*Significant at p <0.001

**Table III:** Association between level of social support and level of hopelessness with depression (N=1356)

Variables	Depression (PHQ-9)			x	df	p-value
	Yes	No	Total			
<b>Level of social support</b>						
Low	234 (62.40%)	141 (37.60%)	375	186.356	1	<0.001**
Medium High	227 (23.10%)	754 (76.90%)	981			
Total	461 (34.00%)	895 (66.00%)	1356			
<b>Level of hopelessness</b>						
No	61 (11.80%)	458 (88.20%)	519	185.400	1	<0.001**
Yes	400 (47.80%)	437 (52.20%)	837			
Total	461 (34.00%)	895 (66.00%)	1356			

\* Significant at p <0.05      \*\*Significant at p <0.001



**Figure 1:** Assessment of model discrimination by area under the ROC Curve for depression

category, where 16 patients (50.00%) experienced mild depression, six (18.80%) had moderate depression, and 10 (31.20 %) had severe depression (24). Meanwhile, in Malaysia, a study done on the prevalence of depression among gynaecological cancer patients at Hospital Bahiyah, Alor Star, Malaysia showed that the prevalence of depression was 18.00% which was higher than the general populations (11). The differences in the prevalence could be due to the number of sample size.

## Factors associated with depression among the respondents

### I. Association between socio-demographic characteristics and severity of cancer with depression among the respondents

There were significant associations between age, gender, marital status, family members living together, education level, stage of cancer, number of chemotherapy cycle, family history of cancer, pain due to chemotherapy, depressed due to cancer, treatment with any anti-depressant, worried of the adverse effects due to cancer treatment, involvement in cancer support society, level of social support and hopelessness with depression.

#### a) Age

In this study, patients with age more than 60 years old were more prevalent to depression when compared to those ages 60 years and below (p<0.001). The results were similar to other findings between age and depression studies (25, 26). The results showed elderly patients were more at risk of depression (26). Furthermore, elderly patients with cancer experience depressive syndrome, which leads to a high risk of committing or attempting



**Table IV:** Predictors of depression among the respondents

Variables	B	S.E.	Wald	df	p-value	AOR	95% CI for AOR	
							Lower	Upper
<b>Age</b>								
≤60						1		
>60	0.431	0.150	8.304	1	0.004	1.539	1.148	2.064
<b>Gender</b>								
Male						1		
Female	0.695	0.157	19.712	1	<0.001	2.004	1.475	2.725
<b>Education</b>								
Educated						1		
Non-educated	0.485	0.165	8.646	1	0.003	1.625	1.176	2.245
<b>Pain due to chemotherapy</b>								
No						1		
Yes	0.856	0.164	27.308	1	<0.001	2.354	1.708	3.246
<b>Depressed due to cancer</b>								
No						1		
Yes	1.215	0.173	49.507	1	<0.001	3.369	2.402	4.725
<b>Treating with any anti depressant</b>								
No						1		
Yes	0.808	0.201	16.181	1	<0.001	2.244	1.514	3.328
<b>Worried of the adverse effect due to cancer treatment</b>								
No						1		
Yes	1.173	0.186	39.648	1	<0.001	3.232	2.243	4.657
<b>Involvement in cancer support society</b>								
Yes						1		
No	0.670	0.155	18.756	1	<0.001	1.954	1.443	2.646
<b>Level of social support</b>								
Medium High						1		
Low	1.899	0.167	129.194	1	<0.001	6.680	4.815	9.269
<b>Level of hopelessness</b>								
No						1		
Yes	1.268	0.190	44.479	1	<0.001	3.555	2.449	5.161

suicide. Old age increases the period of disease, greater probability of cancer metastasis, and higher disability risks (26). These conditions worsen the depression among elderly patients (26).

#### b) Gender

Females were more prevalent to depression when compared to males ( $p < 0.001$ ). In a study conducted by Polikandriotiet al., (2008) on evaluation of depression in patients undergoing chemotherapy showed that females experienced higher depression than males but there were no significant statistics (26). Similarly, a significant prevalence of depression among female as compared with male among 4020 adult cancer inpatients and outpatients in Germany ( $p < 0.001$ ) (25).

#### c) Marital status

In this study, single women were more prone to depression compared to women who were married. This result is similar to a study where widowed women (19.00%) or divorced/separated/single (16.00%) were more likely depressed compared to married women (12.00%) (27). Results from a prospective study also

found that those being single were more likely to have depression ( $p = 0.001$ ) (28). Moreover, married women were anxious due to responsibilities of caring for their families which are the biggest commitments in their lives. While women who are single are likely to be depressed from fear of losing their partner and friends due to their health conditions (10).

#### d) Family members living together

Patients living together with family members were more prevalent to depression as compared to those living alone ( $p = 0.026$ ). These findings are supported by Hassan et al.'s study, (2015) which showed that there was a significant association. Moreover, respondents who have family members living together will be more worried and fear about their health and deaths which will bring more difficulties to their family as their disease prolong (10).

#### e) Education level

Educated respondents had a significantly less prevalence to depression compared to respondents without education ( $p < 0.001$ ). This finding is supported

by Polikandrioti et al's study (2008) which showed that patients with only primary level education experienced significantly higher depression compared to those with secondary and/or tertiary education ( $p < 0.001$ ). This was because patients with lower level of education were reluctant to report their symptoms of depression and they regarded chemotherapy and its side-effects as more significant. In spite of their reluctance, the prevalence was still high. Therefore, the prevalence may actually be much higher than those reported. Patients with low education and who were economically unstable sought advice and care when the disease had reached advanced stage (26).

#### **f) Stage of cancer**

Stages of cancer had significant association ( $p = 0.025$ ) with depression. In this study, stage one and stage two cancer patients were more prone to depression compared to patients in stage three and stage four. These findings were supported by a proportional stratified random sample by using the PHQ-9 questionnaire where a significant relation was found among the stages of cancer with depression ( $p < 0.001$ ) (25). Similar results obtained by several other studies also showed significant association between the stage of cancer and depression (29, 30). Stage two cancer patients were more prone to depression compared to patients in stage three and above because patients in early stage of cancer is unable to manage emotional distress which will significantly worsen the quality outcome in cancer treatment (30).

#### **g) Number of chemotherapy cycles**

This study also found significant association between the number of chemotherapy cycles ( $p = 0.030$ ) with depression among the respondents. In this study, the majority of respondents (68.20%) undergoing 3 and more chemotherapy cycles did not have depression. This result was similar to another finding between number of chemotherapy cycles and depression (31).

#### **h) Family history of cancer**

This study found that the respondents with family history of cancer were more prone to depression. Family history of cancer was significantly associated ( $p = 0.043$ ) with depression. These findings are supported by a study done by Khalil et al (2016), which showed that there was an association between the occurrence of cancer in the family ( $p = 0.047$ ) and depression.

#### **i) Pain due to chemotherapy**

Pain due to chemotherapy was found as a significant predictor of depression in this present study ( $p < 0.001$ ). The results from the present study was comparable to a study that was conducted among 120 gynaecological cancer patients which found that physical pain was associated with Major Depressive Disorders (MDD) in gynaecological cancer patients ( $p < 0.001$ ) (11). Physical pain can precipitate or perpetuate MDD in cancer

patients either from the cancer itself or the side effects of treatment (11). Another study done by Khalil et al (2016) showed that depression was found to be significantly associated with severity of pain ( $p < 0.001$ ).

#### **j) Depressed due to cancer**

Respondents who thought they themselves were depressed due to cancer were found to be significant predictors of depression in this present study ( $p < 0.001$ ). These results from the present study were comparable to a cross-sectional study done by Khalil et al (2016) which showed that there was an association between feeling depressed due to cancer with depression ( $p < 0.001$ ). It was also stated that proper counseling will help in relieving their thoughts that they were depressed may lower their depression level (32).

#### **k) Treatment with any anti-depressant**

Treatment with any anti-depressant was significantly associated with depression ( $p < 0.001$ ). While some patients treated with anti-depressants still had depression, most of the respondents were not treated with any anti-depressant which causes increase in depression level (32.00%). This finding is supported by a study done by Khalil et al (2016) which showed that there was an association between respondents seeking treatment for their depression with depression ( $p = 0.019$ ). Another study done by Polikandrioti et al (2008) showed that only 13 respondents were treated with anti-depressants and there was an association between pharmaceutical therapy with depression ( $p = 0.001$ ).

#### **l) Worried of the adverse effects due to cancer treatment**

This study found that being worried of the adverse effects due to cancer treatment was significantly associated with depression ( $p < 0.001$ ). In the present study, most of the respondents were worried about the adverse effects due to cancer treatment (47.10%). This finding is supported by a study done by Chan and Ismail (2014) which showed that among all symptoms, patients were basically worried about vomiting (33.30%), loss of appetite (23.30%), nausea (16.70%), hair loss and numbness (10.00%). The majority of patients (86.70%) believed that all the symptoms were overlooked by the healthcare providers (33). Another study done by Chintamani et al. (2011) found that after the chemotherapy cycles patients were mostly worried about the side-effects such as nausea and alopecia.

#### **m) Joined any social support society**

This study found that the respondents who had joined any social support society were significantly associated with depression ( $p < 0.001$ ). In the present study, most of the respondents did not join any social support society (44.20%) which led to depression. This finding is supported by a study done by Maneeton et al (2012), using the PHQ-9, which showed that the support system was significantly associated with depression ( $p = 0.024$ ). Cancer patients were significantly more prone to

depression when they had no support system, and had pain and depression which lead to suicidal thoughts (24).

## II. Association between level of social support and depression among the respondents

This study found a significant association between the level of social support ( $p < 0.001$ ) and depression. These findings are supported by a cross-sectional descriptive study where perceived social support was proven in predicting MDD (11). When diagnosed with cancer, mental and family supports were even more important to lessen the depression and psychological distress. Friends, family members, and relatives can support through companionship, comfort, and sense of security to cancer patients. These were crucial factors for buffering emotional distress, as well as preventing and treating MDD (11). In another study done by Ng et al (2010) on anxiety, depression, perceived social support and quality of life in breast cancer patients in Malaysia, showed that cancer patients with poor social support were associated with higher suicidal risk. The higher level of social support perceived among the breast cancer subjects was associated with better quality of life. Several previous studies have reported significant association between social support and depression (34, 35).

## III. Association between level of hopelessness and depression among the respondents

There was significant association between level of hopelessness ( $p < 0.001$ ) with depression in this study. These findings are supported by Arslan et al (2009) where hopelessness was proven in predicting the depression respectively ( $p = 0.01$ ). These findings demonstrated the coexistence of the physical, psychological, and cognitive problems that are faced by cancer patients. Cancer patients' psychological conditions were significantly impacted by depression and hopelessness (36).

### Predictors of depression among the respondents

Out of the 15 risk factors (age, gender, marital status, family member living together, education level, stage of cancer, number of chemotherapy cycle, family history of cancer, pain due to chemotherapy, depressed due to cancer, treatment with any anti-depressant, worried of the adverse effects due to cancer treatment, joined social support society, level of social support and hopelessness), 10 predictors of depression were found in this present study, including; age (AOR 1.539, 95% CI 0.148 to 2.064); gender (AOR 2.004, 95% CI 1.475 to 2.725); education level (AOR 1.625, 95% CI 1.176 to 2.245); pain due to chemotherapy (AOR 2.354, 95% CI 1.708 to 3.246); depressed due to cancer (AOR 3.369, 95% CI 2.402 to 4.725); treatment with any anti-depressant (AOR 2.244, 95% CI 1.514 to 3.328); worried of the adverse effects due to cancer treatment (AOR 3.232,

95% CI 2.243 to 4.657); joined social support society (AOR 1.954, 95% CI 1.443 to 2.646); level of social support (AOR 6.680, 95% CI 4.815 to 9.269); and level of hopelessness (AOR 3.555, 95% CI 2.449 to 5.161). This present study found that the strongest predictor for depression among chemotherapy patients was the level of social support.

## CONCLUSION

This study demonstrates that depression is a major health concern in 10 government state hospitals in Peninsular Malaysia. Low level of social support was shown to be strongly associated with depression. This may be attributed to lack of awareness and lack of emotional and family support which will lead to suicidal risk. To increase the knowledge and awareness among the community, frequent awareness campaigns should be organized and health care professionals should encourage family members to have social support.

## ACKNOWLEDGEMENTS

Authors would like to thank the Director General of Health Malaysia (DGHM) for granting the permission to publish this manuscript. The authors also would like to thank the Faculty of Medicine and Health Sciences, University Putra Malaysia (UPM), Hospital Directors and Department Heads of CDR units of all selected hospitals, all hospital staffs who assisted in the study and all of the contributors and participants of the study. This research was supported and funded by Geran Universiti Putra Malaysia Fasa 2-2014 [grant number.: UPM/700-2/1/GP-P1/2014/9449800].

## REFERENCES

1. World Health Organization (WHO). (2012). World suicide prevention day 2012. Retrieved from: [http://www.who.int/mediacentre/events/annual/world\\_suicide\\_prevention\\_day/en/](http://www.who.int/mediacentre/events/annual/world_suicide_prevention_day/en/)
2. Ferlay, J., Soerjomataram, I., Dikshit, R., Eser, S., Mathers, C., Rebelo, M., Parkin, D. M., Forman, D., & Bray, F. Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. 2015; 136(5):E359-86. doi: 10.1002/ijc.29210.
3. Fitzmaurice, T., Naghavi, M & Murray, C. J.L. The Global Burden of Cancer 2013: Global Burden of Disease Cancer Collaboration. JAMA Oncology 2015; 1(4):505-527. doi:10.1001/jamaoncol.2015.0735.
4. Ministry of health, (2013). Retrieved from :[http://www.moh.gov.my/images/gallery/publications/md/ar/2011\\_en.pdf](http://www.moh.gov.my/images/gallery/publications/md/ar/2011_en.pdf)
5. World Health Organization (WHO). (2014). Retrieved from: [http://apps.who.int/iris/bitstream/10665/112738/1/9789240692671\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/112738/1/9789240692671_eng.pdf)



6. Saniah, A. R., & Zainal, N. Z. Anxiety, Depression and Coping Strategies in Breast Cancer Patients on Chemotherapy. *Malaysian Journal of Psychiatry*, 2010; 19(2).
7. Zhang, G. Z., Yin, Z. Q., You, X. H., & Dong, Y. J. A study on anxiety and depression of cancer patients undergoing radiotherapy and chemotherapy in the initial stage and their coping state. *Chinese Nursing Research*, 2007; 21:2852–2584.
8. American Cancer Society, (2015). A guide to chemotherapy. Extracted from: [http://jgh.ca/uploads/gynonc/chemo/guide%20to%20chemotherapy\\_ACS.pdf](http://jgh.ca/uploads/gynonc/chemo/guide%20to%20chemotherapy_ACS.pdf)
9. Khamechian, T., Alizargar, J., & Mazoochi, T. Prevalence of Depression in patients with Cancer. *Middle-East Journal of Scientific Research*, 2013; 15(9):1311-1315.
10. Hassan, M. R., Shah, S. A., Ghazi, H. F., Mujar, N. M. M., Samsuri, M. F., & Baharom, N. Anxiety and Depression among breast cancer patients in a urban setting in Malaysia. *Asian Pacific Journal of Cancer* 2015; 16(9): 4031-5.
11. Tee, B. C., Phang, C. K., Rasidi, A., Rushdan, M., Aliyasand, I., & Hatta, S. The Prevalence and Risk Factors of Major Depressive Disorders in Gynaecological Cancer Patients. *Malaysian Journal of Medicine and Health Sciences*, 2013; 9(2):53-61.
12. Zainal, N., Hui, K., Hang, T., & Bustam, A. Prevalence of distress in cancer patients undergoing chemotherapy. *Asia-Pacific Journal of Clinical Oncology*, 2007; 3:219-223.
13. Kroenke, K., & Spitzer, R. L. The PHQ-9: a new depression diagnostic and severity measure. *Psychiatric Annals*, 2002; 32:509-521.
14. Kroenke, K., Spitzer, R. L., & Williams, J. B. W. The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*, 2001; 16(9):606–613, doi:10.1046/j.1525-1497.2001.016009606.x
15. Hinz, A., Mehnert, A., Kocalevent, R. D., Brahler, E., Singer, T. F. S., & Schulte, T. Assessment of depression severity with the PHQ-9 in cancer patients and in the general population. *BMC Psychiatry*, 2016; 16:22 DOI 10.1186/s12888-016-0728-6.
16. Randall, J. M., Voth, R., Burnett, E., Bazhenova, L., & Bardwell, W. A. Clinic-based depression screening in lung cancer patients using the PHQ-2 and PHQ-9 depression questionnaires: a pilot study. *Support Care Cancer*, 2013; 21:5,1503-7, doi: 10.1007/s00520-012-1712-4.
17. Johns, S. A., Kroenke, K., Krebs, E. E., Theobald, D. E., Wu, J., & Tu, W. Longitudinal Comparison of Three Depression Measures in Adult Cancer Patients. *J Pain Symptom Manage*, 2013; 45(1):71–82. doi:10.1016/j.jpainsymman.2011.12.284.
18. Sherina, M. S., Arroll, B., & Smith, F. G. Criterion Validity of the PHQ-9 (Malay Version) in a Primary Care Clinic in Malaysia. *Medical Journal of Malaysia*, 2012; 67(3)309–315.
19. Beck, A. T., & Steer, R. A. Beck hopelessness scale manual (p. 29). The Psychological Corporation, San Antonio; 1988.
20. Zimet, G.D., Powll, S.S., Farley, G. K., Werkman, S., & Berkoff, K.A. Psychometric characteristics of the Multidimensional Scale of Perceived Social Support. *Journal of Personality Assessment*, 1990; 55:610-17.
21. Ng, C. G., Siddiq, A. N. A., Aida, S. A., Zainal, N. Z., & Koh, O. H. Validation of the Malay version of the Multidimensional Scale of Perceived Social Support (MSPSS-M) among a group of medical students in Faculty of Medicine, University Malaya. *Asian Journal of Psychiatry*, 2010; 3:3–6.
22. Agarwal, M., Hamilton, J. B., Moore, C. E., & Crandell, J. L. Predictors of Depression Among Older African American Cancer Patients. *Cancer Nursing*, 2010; 33(2):156–163, doi:10.1097/NCC.0b013e3181bd.
23. Chung, J., Ju, G., Yang, J., Jeong, J., Jeong, Y., Choi, M. K., Kwon, J., Lee, K. H., Kim, S. T., & Han, H. S. Prevalence of and factors associated with anxiety and depression in Korean patients with newly diagnosed advanced gastrointestinal cancer. *The Korean Journal of Internal Medicine*, 2017; <https://doi.org/10.3904/kjim.2016.108>.
24. Maneeton, B., Maneeton, N., & Mahathep, P. Prevalence of Depression and its Correlations: a Cross-sectional Study in Thai Cancer Patients. *Asian Pacific Journal of Cancer Prevention*, 2012; 13(5):2039-43, DOI:<http://dx.doi.org/10.7314/APJCP.2012.13.5.2039>.
25. Hartung, T.J., Brahler, E., Faller, H., Harter, M., Hinz, A., Johansen, C., Keller, M., Koch, U., Schulz, H., Weis, J., & Mehnert, A. The risk of being depressed is significantly higher in cancer patients than in the general population: Prevalence and severity of depressive symptoms across major cancer types. *European Journal of Cancer*, 2016; 72:46-53, doi:10.1016/j.ejca.2016.11.017.
26. Polikandrioti, M., Evaggelou, E., Zerva, S., Zerdila, M., Koukoularis, D., & Kyritsi, E. Evaluation of depression in patients undergoing chemotherapy. *Health Science Journal*, 2008; 2(3).
27. Chen, X., Zheng, Y., & Shu, X. O. Prevalence of depression and its related factors among Chinese women with breast cancer. *Acta Oncologica*, 2009; 48(8):1128-1136.
28. Srivastava, V., Ansari, M. A., Kumar, A., Shah, A. G., Meena, R. K., Sevach, P., & Singh, O. P. Study of Anxiety and Depression among Breast Cancer Patients from North India, *Clinical Psychiatry*, 2016; 2(1), doi: 10.21767/2471-9854.100017.
29. Akin-Odanye, E. O., Chioma, C. A., & Abiodun, O. P. Measured effect of some socio-demographic factors on depression among breast cancer patients receiving chemotherapy in Lagos State University

- Teaching Hospital (LASUTH). African Health Sciences, 2011; 11(3):341-345.
30. Santre, M., Rathod, J., & Maidapwa, S. Prevalence of Emotional Distress in Cancer Patients . IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), 2014; 13(6):09-14, [www.iosrjournals.org](http://www.iosrjournals.org).
31. Duric, V. M., Butow, P. N., Sharpe, L., Boyle, F., Beith, J., Wilcken, N. R. C., Heritier, S., Coates, A. S., Simes, R. J., & Stockler, M. R. Psychosocial factors and patients preferences for adjuvant chemotherapy in early breast cancer. *Psycho-Oncology*, 2007; 16:48-59.
32. Khalil, A., Faheem, M., Fahim, A., Innocent, H., Mansoor, Z., Rizvi, S., & Farrukh, H. Prevalence of Depression and Anxiety amongst Cancer Patients in a Hospital Setting: A Cross-Sectional Study. *Psychiatry Journal* 2016;1-6.
33. Chan, H. K., & Ismail, S. Side Effects of Chemotherapy among Cancer Patients in a Malaysian General Hospital: Experiences, Perceptions and Informational Needs from Clinical Pharmacist. *Asian Pacific Journal of Cancer Prevention*, 2014; 15(13):5305-9.
34. Rizalar, S., Ozbas, A., Akyolcu, N., & Gungor, B. Effect of perceived social support on psychosocial adjustment of Turkish patients with breast cancer. *Asian Pacific Journal Cancer Prevention*, 2014; 15(8):3429-34.
35. Sengul, M. C. B., Kaya, V., Sen, C. A., & Kaya, K. Association between suicidal ideation and behavior, and depression, anxiety, and perceived social support in cancer patients. *Medical Science Monitor*, 2014; 20:329-336, doi:10.12659/MSM.889989.
36. Sahin, Z. A., Tan, M., & Polat, H. Hopelessness, Depression and Social Support with End of Life Turkish Cancer Patients. *Asian Pacific Journal of Cancer Prevention*, 2013; 14(5):2823-8.
37. Lemeshow, S., Hosmer, D. W., Klar, J., & Lwanga, S. K. Adequacy of sample size in health studies. Hoboken, NJ, Wiley, 1990.
38. Arslan, S., Celebioglu, A., & Tezel, A. Depression and hopelessness in Turkish patients with cancer undergoing chemotherapy. *Japan Journal of Nursing Science*, 2009 6(2):105-10. doi: 10.1111/j.1742-7924.2009.00127.x.
39. Chintamani, Gogne, A., Khandelwal, R., Tandon, M., Jain, S., Kumar, Y., Narayan, N., Bamel, R., Srinivas, S., & Saxena, S. The correlation of anxiety and depression levels with response to neoadjuvant chemotherapy in patients with breast cancer. *Journal of the Royal Society of Medicine Short Reports*, 2011; 2(3):15, doi:10.1258/shorts.2010.010072.